REMARKS

This is a full and timely response to the non-final Office Action mailed May 11, 2009. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

Telephone Conversation Status of Patent Application

Examiner Schmidt is thanked for the telephone conversation conducted on July 23, 2009. Proposed claim amendments were discussed. Asserted art was discussed. It appears that the claim objection is overcome. It appears that the rejections under 35 U.S.C. § 112 are overcome. It appears that the rejections under 35 U.S.C. § 101 are overcome.

Present Status of Patent Application

Claims 1, 2, 6, 19, 20, 23, 28, 37-40, and 45-51 are now pending in the present application. Claims 1, 19, 23, 50 and 51 are currently amended without introduction of new matter; claims 2 and 20 are original claims; claims 6, 28, 37-40, and 45-49 are previously presented; claims 3-5, 7-9, 12-14, 16-18, 21-22, 24-27, 29-36, and 42 are cancelled without prejudice, waiver, or disclaimer; and claims 10, 11, 15, 41, 43 and 44 have been withdrawn as a result of a restriction that has been imposed by the Examiner in the current Office action. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

Claim Objections

Statement of the Objection

Claim 51 objected to because of the following informalities: Claim 51 appears to be a run-on sentence and an incomplete claim. Appropriate correction is required.

Response to the Objection

Applicants respectfully submit that the reason for the objection may have possibly originated from misinterpreting the period mark (.) in the term ".setjmp" cited in the claim. In

this connection, attention is drawn to paragraph [0033] and others wherein a table titled a ".setjmp table" has been described.

Nonetheless, in an effort to reduce any potential ambiguities, Applicants have opted to amend the claim so as to omit the period mark. Consequently, the claim now includes a "setjmp table" that is used for storing valid target addresses associated with a "longjmp" runtime function.

In view of the amendment described above, Applicants respectfully request withdrawal of the objection to pending claim 51.

Claim Rejections under 35 U.S.C. §112

Statement of the Rejection

Claims 1, 2, 6, 28, 37-40, 50-51 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1

The examiner notes that "storing in a table, the list of valid target addresses as a reference list of valid target addresses" is indefinite. Where is this table stored? Is it in the object file or is in executable code or is it stored some where else (e.g. memory, etc). The examiner will interpret storing in a table of valid target addresses to be within an object file.

Response to the Rejection

Applicants respectfully disagree that claim 1 is indefinite, however, without prejudice or disclaimer, Applicants have opted to currently amend independent claim 1 in order to clarify that the table is part of an object file (as accurately interpreted by Examiner).

Consequently, Applicants respectfully request that the rejection of claim 1 (as well as dependent claims 2, 6, 28, 37-40, 50-51) under 35 U.S.C. 112, be withdrawn.

Claim Rejections under 35 U.S.C. §101

Statement of the Rejection

Claims 1-2, 6, 28, 37-40 and 50-51 are rejected under 35 U.S.C. 101 s not falling within one of the four statutory categories of invention.

...

Claims 19-20, 23, 45-49 are rejected under 35 U.S.C. 101 s not falling within one of the four statutory categories of invention.

Response to the Rejection

Claims 1-2, 6, 28, 37-40 and 50-51

The Office action asserts on page 5: "*The instant claims are neither positively tied to a particular machine that accomplishes the claimed method steps nor transform underlying subject matter, and therefore do not qualify as a statutory process.*"

In response thereto, Applicants have amended independent claim 1 to indicate that the method steps cited in the claim are performed using computer-executable instructions that are stored in a computer-readable storage medium, and respectfully request that the rejection of claim 1 (as well as dependent claims 2, 6, 28, 37-40, 50-51) under 35 U.S.C. 101 be withdrawn.

Claims 19-20, 23, and 45-49

The Office action asserts on page 5: "*Claims 19-20, 23, 45-49 are directed to "computer program products." Generally, functional descriptive material, such as a computer program, is statutory when it is stored on a tangible computer readable medium.*"

In response thereto, Applicants have amended independent claim 19 to indicate that the claim is directed to a computer system that includes a computer-readable storage medium for storing program modules. Applicants respectfully submit that the rejection of claim 19 under 35 U.S.C. 101 has been overcome because the amendment now positively ties the claim to a computer system and a computer-readable storage medium.

Consequently, Applicants respectfully request that the rejection of claim 19 (as well as dependent claims 20, 23, and 45-49) under 35 U.S.C. 101 be withdrawn.

Claim Rejections under 35 U.S.C. §103

Statement of the Rejection

Claims 1, 2, 6, 19, 23, 28, 37-40, and 45-51 are rejected under 35 U.S.C. 103(a), as best understood, as being unpatentable over Lueh (US 6,658,657 B1) in view of and Kaufer et al. (US 5,812,828) and Richarte, Gerardo. "Four different tricks to bypass Stackshield and StackGuard protection".

Response to the Rejection

Claim 1

Applicants respectfully traverse the rejection of this claim, for various reasons as explained below. Nonetheless, Applicants have opted to currently amend rejected independent claim 1 in order to move forward prosecution in the case. As amended, the claim now includes: "*concluding that a first object file has no valid target addresses pertaining to runtime functionality, upon detecting: a) the presence of the identifier in the first object file, and b) the absence of a runtime section of code in the first object file*," and further includes: "*concluding that a second object file has a list of valid target addresses pertaining to runtime functionality, upon detecting: a) that the identifier in the second object file is present and has been asserted, and b) that a runtime section of code is present in the second object file.*" Applicants respectfully submit that this aspect of the claim (which is described in Applicants' specification in various places such as in paragraphs [0036] and [0037] for example), is neither reasonably taught nor suggested by the cited references, individually or combinedly.

The cited references also fail to teach or suggest other aspects of the claim, such as the "identifier" for example. In this context, Applicants respectfully draw attention to the fact that the Office action is very unclear in providing details for substantiating the rejection, and specifically makes several ambiguous and contradictory statements pertaining to Applicants' "identifier."

To elaborate, attention is drawn to page 10 of the Office action, wherein it is asserted: "*It would have been obvious to one of ordinary skill in the art at the time the invention was made to*

modify the teachings of Lueh in view of Kaufer to include compiling code to produce executable code that is marked with an identifier indicating that the executable code supports runtime protection; receiving a call to a runtime function of the executable code for a runtime function; and if the target address is not found on the reference list of a valid target addresses then terminating execution of the executable code as taught by Richarte." (Emphasis added).

Judging by this assertion, it would appear that Kaufer teaches "*executable code that is marked with an identifier*."

However, this assertion is contradicted on page 9 of the Office action wherein it is admitted that "*Lueh in view of Kaufer **fails** to disclose code to produce executable code that is marked with an identifier indicating that the executable code supports runtime protection*." (Emphasis added).

This admission is in line with the statements pertaining to Lueh and/or Kaufer that are provided on pages 8-9 of the Office action. None of these statements identify where in either Lueh or Kaufer can be found Applicants' "identifier." To the contrary, it would appear from other statements on pages 9-10 of the Office action that Richarte is being relied upon as teaching a "canary" that is allegedly equivalent to Applicants' "identifier".

If this is indeed the case, Applicants respectfully draw attention to remarks submitted in their previous response, which refutes this allegation. A pertinent portion of this previous response is reproduced below for easy reference:

> Attention is respectfully drawn to page 5 of the current Office action wherein it is alleged that the cited reference of Richarte discloses "*executable code which is marked with a canary (e.g. identifier) for runtime protection.*" Applicants acknowledge that Richarte does indeed disclose runtime protection using a canary in the form of a constant "0x000aff0d" that is pushed into his stack. Protection against buffer overflow attacks is provided by checking to see if the value of the constant (the canary) has been changed as a result of an attack. Richarte describes this aspect in his pages 5-6 (under StackGuard protection) as follows: "*A standard stack based buffer overflow attack would change the return address, and on its way will overwrite the canary, so, unless we write the right*

> *value in the canary the check in the epilog will fail and abort the program.*"
>
> In contrast, Applicants' claim 1 is directed at using an identifier as a flag to indicate that runtime protection has been provided in a portion of executable code. In other words, unlike Richarte whose canary itself is used to check for attacks, the identifier of Applicants' claim 1 is not used directly to check for attacks. Instead, Applicants' identifier is used to indicate the presence of runtime protection (in the form of a valid target address located in an object code).

Notwithstanding the fact (as explained above), that Richarte's "canary" does not reasonably teach or suggest Applicants' "identifier," Applicants have opted to amend claim 1 in order to eliminate any potential ambiguity in interpreting this aspect of the claim. As amended the claim now recites: "*compiling source code files to produce a plurality of object files, each of which is marked with an identifier for indicating that executable code generated from each of the plurality of object files supports runtime protection.*" Consequently, one of ordinary skill in the art can readily recognize the differences between the use of Applicants' identifier and Richarte's canary.

In summary, Applicants respectfully submit that cited references, individually and/or combinedly, fail to teach or suggest various aspects of Applicants claim 1, thereby making the claim allowable at least in currently amended form. Consequently, Applicants request withdrawal of the rejection followed by allowance of the claim.

Claims 2, 6, 28, 37-40, 50 and 51

Applicants respectfully traverse the rejection of these claims for various reasons.

For example, in rejecting Applicants' **claim 50**, the Office action makes the following assertion on page 15 of the Office action: "*Lueh in view of Kaufer and Ricarte discloses the use of an linking executable code to object fields (see Kaufer, col. 3, lines 57-col. 4, lines 42) and further an identifier that is 4 bytes long that indicates that the executable code implements runtime protections (see Ricarte, page 5).*

Lueh in view of Kaufer and Ricarte fails to disclose wherein the identifier is a bit. The examiner notes it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Lueh in view of Kaufer and Ricarte to modify the 4 byte long identifier and design it to be a bit as a matter of design choice." (Emphasis added).

With reference to the first portion that is emphasized above (i.e., "*an identifier that is 4 bytes long that indicates that the executable code implements runtime protections (see Ricarte, page 5)*"), attention is drawn to Richarte's page 5, which teaches a 4 byte canary. As shown in his table, this canary corresponds to a constant value (0x000aff0d) that is described in his lines 1-2 page 5, as follows: "*... pushing a canary into the stack (for StackGuard v2.0.1 it's a constant 0x000aff0d, latter* (sic) *we will see why)...*"). A more detailed explanation of how a change in this constant value of the canary provides an indication of a stack based buffer overflow attack is provided in his pages 5-6.

In contrast to Richarte's approach wherein a change in a constant value (the canary) is used to detect an attack, Applicants' identifier is used to provide an indication that the code supports runtime protection (i.e. the actual protection is carried out via "*the runtime section of code*" as cited in the claim, rather than the identifier itself).

More importantly, it will be pertinent to point out that Richarte's canary is selected so as to thwart an attacker from guessing the constant value (Richarte describes this aspect in his page 27 vis-à-vis his "random canary"). Consequently, it is illogical on the part of the Office action (page 15) to assert that it would have been obvious to modify Richarte's 4 byte code and design it as a 1-bit code, when this code is **expressly** designed to avoid detection by an attacker. One of ordinary skill in the art can recognize that a 1-bit implementation provides an insignificant level of encoding in comparison to codes containing a larger number of bits. Consequently, it will be illogical and counter-intuitive to reduce the number of bits from 4 to 1, rather than increase it to a number greater than 4.

Also, it will be pertinent to point out to additional aspects of claim 50. For example, the claim further includes: "*an identifier that is operable to be set for indicating...*" This action of "setting" (asserting) the identifier is used to indicate the presence/absence of runtime protection in Applicants' code.

As described in Applicants' paragraph [0036]: "*Thus, setting this bit declares that a section in the object file comprises a list of valid target or return addresses for the executable code in that object.*" Furthermore, as indicated in Applicants' paragraph [0037]: "*It is*

contemplated that if the object file does not contain a .setjmp section, but the bit marking the object file is present, then the code in the object file has no longjmp target or setjmp return addresses."

The above-mentioned aspects are also cited in amended claim 1 ("*concluding that a first object file…*" and "*concluding that a second object file…*" etc.).

In summary, Applicants respectfully submit that cited references, individually and/or combinedly, fail to teach or suggest various aspects of Applicants claim 50 (as well as claim 1) thereby making these claims allowable.

Applicants further point out that each of dependent claims 2, 6, 28, 37-40, 50, and 51 are also allowable for at least the reason that these claims are dependent on allowable claim 1. Consequently, Applicants respectfully request withdrawal of the rejection followed by allowance of these claims.

Claim 19

Applicants have opted to currently amend rejected independent claim 19 in order to move forward prosecution in the case. As amended, the claim now includes: "*a compiler that compiles source code files to produce a plurality of object files, wherein each of the plurality of files is produced by the compiler with* an identifier that operates as a marker which when placed in a set condition provides an indication *that the object file contains a list of valid target addresses for use in implementing runtime protection*."

Certain remarks (pertaining to the identifier) made above in response to the rejection of claim 1 are equally pertinent to the rejection of claim 19 as well. However, in the interest of brevity these remarks will not be repeated herein. In short, Applicants respectfully submit that cited references, individually and/or combinedly, fail to teach or suggest various aspects of Applicants claim 19 thereby making the claim allowable at least in currently amended form. Consequently, Applicants request withdrawal of the rejection followed by allowance of the claim.

Claims 23, and 45-51

Applicants respectfully traverse the rejection of these claims for various reasons.

However, rather than elaborating upon these reasons, Applicants respectfully point out that claims 23, and 45-51 are allowable for at least the reasons that these claims are dependent on independent claim 19 that is allowable. Consequently, Applicants respectfully request withdrawal of the rejection followed by allowance of these claims.

Cited Art Made of Record

The cited art made of record has been considered, but is not believed to affect the patentability of the presently pending claims.

CONCLUSION

Applicants respectfully submit that pending claims are allowable. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned representative.

Date: August 11, 2009

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